

What is Claimed:

- 1 1. A mega-boule for use in fabricating microchannel plates
2 (MCPs), the mega-boule comprising

3 a cross-sectional surface including an island section, an inner
4 perimeter section and an outer perimeter section, each section occupying a distinct
5 portion of the cross-sectional surface,

6 wherein the island section is formed of a first plurality of optical fibers,
7 transversely oriented to the cross-sectional surface, each optical fiber including a
8 cladding formed of non-etchable material and a core formed of etchable material,

9 the inner perimeter section is formed of non-etchable material and is
10 disposed to surround the island section, and

11 the outer perimeter section is formed of a second plurality of optical
12 fibers, transversely oriented to the cross-sectional surface, each optical fiber
13 including a cladding formed of non-etchable material and a core formed of etchable
14 material, and the outer perimeter section is disposed to surround the island section
15 and the inner perimeter section.
- 1 2. The mega-boule of claim 1 further including

2 at least another section occupying a distinct portion of the cross-
3 sectional surface,

4 wherein the other section is formed of non-etchable material, and is
5 separated from the inner perimeter section by the outer perimeter section.

1 3. The mega-boule of claim 2 wherein

2 the first and second plurality of optical fibers and the non-etchable
3 material of the inner perimeter section and the other section form a fused monolithic
4 stack, when heated and pressed.

1 4. The mega-boule of claim 1 wherein

2 the etchable material and the non-etchable material are glass, and

3 the non-etchable material includes a higher lead content than the
4 etchable material.

1 5. The mega-boule of claim 1 wherein

2 the non-etchable material of the inner perimeter section includes a
3 plurality of support rods transversely oriented to the cross-sectional surface.

1 6. The mega-boule of claim 1 wherein

2 the non-etchable material of the inner perimeter section includes a
3 plurality of support rods transversely oriented to the cross-sectional surface, and

4 the first plurality of optical fibers of the island section and the plurality
5 of support rods of the inner perimeter section are configured for use as an MCP.

1 7. The mega-boule of claim 1 wherein
2 an optical fiber of the first plurality of optical fibers of the island
3 section and an optical fiber of the second plurality of optical fibers of the outer
4 perimeter section are substantially similar in cross-section.

1 8. The mega-boule of claim 1 wherein
2 the first plurality of optical fibers of the island section form transverse
3 microchannels for an MCP, when the island section is etched, and
4 the second plurality of optical fibers of the outer perimeter section
5 form perforated cleave planes, when the outer perimeter section is etched.

1 9. The mega-boule of claim 1 wherein
2 the island section, the inner perimeter section and the outer perimeter
3 section have one of a rectangular configuration and a circular configuration.

1 10. The mega-boule of claim 1 wherein
2 the outer perimeter section and the island section form an MCP, and
3 the outer perimeter section includes a sufficient cross-sectional width
4 for forming perforated cleave planes to break away the MCP from the mega-boule,
5 and

6 for preventing the MCP die accidentally breaking away during
7 fabrication of the MCP.

1 11. A method of fabricating microchannel plates (MCPs) comprising
2 the steps of:

3 (a) providing bundles of optical fibers, wherein each optical fiber
4 includes a cladding formed of non-etchable material and a core formed of etchable
5 material;

6 (b) stacking a plurality of the bundles to form at least one island
7 section, defining a mini-boule;

8 (c) stacking non-etchable material to surround the mini-boule and
9 form an inner section that surrounds the mini-boule;

10 (d) stacking etchable material to surround the inner section and
11 form an outer section that surrounds the inner section;

12 (e) stacking additional non-etchable material to surround the outer
13 section and form an exterior section; and

14 (f) fusing the mini-boule, the inner section, the outer section and
15 the exterior section to form a mega-boule for use in fabricating the MCPs.

1 12. The method of claim 11 further including the steps of:

2 (g) dicing the mega-boule to form multiple mega-boule wafers,
3 each mega-boule wafer defining a batch die; and

4 (h) activating, and metallizing a mega-boule wafer for forming the
5 MCPs.

1 13. The method of claim 12 wherein step (h) includes

2 etching an outer section of the mega-boule wafer to form perforated
3 cleave planes, and breaking the perforated cleave planes to extract an MCP from the
4 mega-boule wafer.

1 14. The method of claim 12 wherein step (h) includes

2 etching the mega-boule wafer to form microchannels in the cores of
3 the optical fibers,

4 etching the outer sections of the mega-boule wafer to form perforated
5 cleave planes, and

6 breaking the perforated cleave planes to extract the MCPs from the
7 mega-boule wafer.

1 15. The method of claim 14 wherein etching the mega-boule wafer
2 to form the microchannels is performed before etching the outer sections of the
3 mega-boule wafer to form the perforated cleave planes.

1 16. A method of fabricating microchannel plates (MCPs) comprising
2 the steps of:

3 (a) stacking etchable and non-etchable optical materials to form a
4 plurality of mini-boules, the mini-boules separated from each other and forming
5 separate islands along a cross-sectional surface;

6 (b) stacking non-etchable optical material to surround the plurality
7 of mini-boules and form a plurality of inner perimeter sections along the cross-
8 sectional surface, each surrounding a corresponding mini-boule;

9 (c) stacking etchable and non-etchable optical materials to
10 surround the plurality of inner perimeter sections and form a plurality of outer
11 perimeter sections along the cross-sectional surface, each surrounding a
12 corresponding inner perimeter section; and

13 (d) fusing the stacked etchable and non-etchable optical materials
14 of steps (a)-(c) to form a mega-boule for use in fabricating the MCPs.

1 17. The method of claim 16 wherein step (c) includes

2 stacking additional non-etchable material to surround the plurality of
3 outer perimeter sections and form an exterior section along the cross-sectional
4 surface.

1 18. The method of claim 16 wherein step (a) includes stacking
2 optical fibers, each optical fiber having a cladding formed of non-etchable material
3 and a core formed of etchable material.

1 19. The method of claim 16 wherein step (c) includes stacking
2 optical fibers, each optical fiber having a cladding formed of non-etchable material
3 and a core formed of etchable material.

1 20. The method of claim 19 including the step of:

2 (e) etching at least one outer perimeter section of the plurality of
3 outer perimeter sections to form perforated cleave planes in the one outer perimeter
4 section for breaking away an island and an inner perimeter section disposed within
5 the one outer perimeter section.